SURVEY OF VIRUSES AFFECTING FABA BEAN IN SIX ARAB COUNTRIES

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Abstract

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A field survey of faba bean (*Vicia faba* L.) for viruses in six Arab countries showed the presence of nine viruses. Bean leaf roll virus (BLRV), bean yellow mosaic virus (BYMV), broad bean mottle virus (BBMV) and to a lesser extent broad bean stain virus (BBSV) were the most common. When testing with ELISA 789 samples with symptoms suggestive of virus infection collected from Egypt, Lebanon, Morocco, Sudan, Syria and Tunisia, BBMV was detected in 203 samples, BBSV in 151, broad bean true mosaic virus (BBTMV) in 7, broad bean wilt virus (BBWV) in 47, BYMV in 314, cucumber mosaic virus (CMV) in 96, pea enation mosaic virus (PEMV) in 31, and pea seed-borne mosaic virus (PSbMV) in 49 samples. Identity of selected field isolates was confirmed by electron microscopy and host reaction studies. In a yield experiment, infection with BYMV, BBMV and BBSV 11 weeks after sowing (pre-flowering) led to 81, 54 and 84% yield loss, respectively. Inoculation with the same viruses 15 weeks after sowing (flowering) and 20 weeks after sowing (pod setting) led to 56, 84 and 18%, and 39, 37 and 18% yield loss, respectively.

Key words: faba bean, viruses, Arab countries.

INTRODUCTION

Faba bean (*Vicia faba* L.) is an important food crop in many Arab countries. It is considered the main protein source for a large part of the population. Productivity of the crop is affected by a number of factors including viruses. Some 44 viruses are known world-wide to affect faba bean (3, 5, 9, 23), but only few of them were reported so far from Arab countries (1, 2, 10, 11, 16, 17). Tentative studies indicated the presence of nine faba bean viruses in six West Asian and North African countries, and the present study was undertaken to evaluate their incidence and the potential yield losses caused by the major ones. Results of more detailed studies on broad bean stain virus (BBSV) and broad bean mottle virus (BBMV) have already been published or are ready for publication (18, 19).

MATERIALS AND METHODS

Field observations and sample collection. Faba bean fields were visited during March-April 1985, 1986 and 1987 in Syria, Tunisia and Morocco. In Lebanon such visits were made in April of 1985, and in Egypt and Sudan in January 1986. Samples of faba bean with symptoms suggestive of virus infection were collected from farmers' fields and from experimental plots of agricultural research stations. Samples were brought to the laboratory in Aleppo and each sample was split into two portions. One was desiccated over calcium chloride for virus recovery and electron microscopy when needed, and the other was extracted in 0.2 M phosphate buffer, PH 6.0, and used for ELISA.

Serological tests. Antisera to broad bean mottle virus (BBMV), broad bean stain virus (BBSV), cucumber mosaic virus (CMV) and pea enation mosaic virus (PEMV) had been produced in our laboratory. Antisera to bean leaf roll virus (BLRV = pea leaf roll virus) and subterranean clover red leaf virus (SCLRV) were provided by J.W. Ashby (DSIR, New Zealand), to bean yellow mosaic virus (BYMV) by J. Rabdles (University of Adelaide, Australia), to broad bean true mosaic virus (BBTMV) by H. Rohloff (BBA, Braunschweig, FRG), and to broad bean wilt virus (BBWV) and pea seed-borne mosaic virus (PSbMV) by D.Z. Maat (IPO, Wageningen, the Netherlands).

The procedure for direct double-sandwich ELISA was as described by Clark and Adams (8), but for sample extraction 0.2 M phosphate buffer, PH 6.0, was used.

Electron microscopy. Selected field samples were examined with the electron microscope (EM) for virus particles to confirm tlidentityify revealed by serology. Leaf samples, either fresh or desiccated over calcium chloride, were then chopped in sodium phosphotungstate (PTA 2% PH 6.5) for negative staining before viewing with the EM.

Yield loss assessment. A field experiment was conducted